

**Pakistan
2005 Earthquake**

Preliminary Damage and Needs Assessment

**Prepared By
Asian Development Bank
and
World Bank**

**Islamabad, Pakistan
November 12, 2005**

CURRENCY AND EQUIVALENTS

Currency Unit = Pakistan Rupee
US\$1 = PKR 59.4

FISCAL YEAR

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ABBREVIATIONS AND ACRONYMS

| | | | |
|--------------|---|-----------------|--|
| ADB | Asian Development Bank | LPG | Liquefied Petroleum Gas |
| ADP | Annual Development Plans | MOH | Ministry of Health |
| AIDS | Acquired Immune Deficiency Syndrome | MOWP | Ministry of Water and Power |
| AEZs | Agro-Ecological Zones | MPNR | Ministry of Petroleum and Natural Resources |
| AJK | Azad Jammu Kashmir | MSW | Municipal Solid Waste |
| AJKED | Electricity Department of Azad J. Kashmir | NCHD | National Commission for Human Development |
| ARI | Acute Respiratory Infection | NGOs | Non-Governmental Organizations |
| CAA | Civil Aviation Authority | NHA | National Highway Authority |
| CAS | Country Assistance Strategy | NWFP | North West Frontier Province |
| CFAA | Country Financial Accountability Assessment | OMC | Oil Marketing Companies |
| CISP | Community Infrastructure and Services Project | P&DD | Planning and Development Department |
| CMU | Concrete Masonry Unit | PESCO | Peshawar Electricity Supply Company |
| DAC | Disaster Assessment and Coordination | PHC | Primary Health Care |
| DECC | District Emergency Coordination Committee | PHED | Public Health Engineering Department |
| DFID | Department for International Development | PIFRA | Project to Improve Financial Reporting and Auditing |
| DPL | Development Policy Loan | PIHS | Pakistan Integrated Household Survey |
| ECLAC | Economic Commission for Latin America and the Caribbean | PPAF | Pakistan Poverty Alleviation Fund |
| EMG | Emergency Management Group | PRSC | Poverty Reduction Support Credit |
| ERC | Emergency Relief Cell | PRSP | Poverty Reduction Strategy Paper |
| ERP | Earthquake Recovery Program | PSCB | Public Sector Capacity Building |
| ERRA | Earthquake Reconstruction and Rehabilitation Authority | PWD | Public Works Department |
| FAO | Food and Agricultural Organization | RCC | Reinforced Cement Concrete |
| FHA | Frontier Highway Authority | SAC | Structural Adjustment Credit |
| GDP | Gross Domestic Product | SC | Steering Committee |
| GIS | Geographical Information System | SHYDO | Sarhad Hydro Development Organization |
| GOP | Government of Pakistan | SMEDA | Small and Medium Enterprise Dev. Authority |
| GTZ | German Agency for Technical Cooperation | STG | Secondary Transmission and Grid |
| HIV | Human Immunodeficiency Virus | SUPARCO | Space and Upper Atmosphere Research Commission |
| IBRD | International Bank for Reconstruction and Development | TMA | Tehsil Municipal Administration |
| IDA | International Development Association | UN | United Nations |
| IESCO | Islamabad Electricity Supply Company | UNDP | United Nations Development Programme |
| IFAD | International Fund for Agricultural Development | UNESCO | United Nations Education, Scientific and Cultural Organization |
| JBIC | Japan Bank for International Cooperation | UNFPA | United Nations Population Fund |
| JICA | Japan International Cooperation Agency | UNICEF | United Nation Children's Fund |
| KfW | Kreditanstalt für Wiederaufbau | USAID | United States Agency for International Development |
| LGRDD | Local Government and Rural Development Department | WAPDA | Water and Power Development Authority |
| LHW | Lady Health Workers | WEF | World Economic Forum |
| | | WHO | World Health Organization |

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**PAKISTAN
2005 EARTHQUAKE**

PRELIMINARY DAMAGE AND NEEDS ASSESSMENT

Prepared by the Asian Development Bank and the World Bank

October 24 – November 5, 2005

PREFACE

1. At the request of the Government of Pakistan, a mission led by the Asian Development Bank (ADB) and the World Bank conducted a preliminary damage and needs assessment. This assessment estimates the damage and reconstruction costs of the October 8, 2005 earthquake that struck areas of the North West Frontier Province (NWFP) and Azad Jammu and Kashmir (AJK) in Pakistan. Experts from the government as well as international organizations, including the European Union, the United Kingdom's Department for International Development (DFID), the German Agency for Technical Cooperation (GTZ), the German KfW, the Japan Bank for International Cooperation (JBIC), the Japan International Cooperation Agency (JICA), the United States Agency for International Development (USAID), the World Health Organization (WHO), the UN Food and Agriculture Organization (FAO), the UN Children's Fund (UNICEF), the United Nations Development Programme (UNDP), and other UN agencies, also participated in this assessment. The mission benefited from the guidance and support of a core group of seven donors including the ADB, DFID, the European Union, Japan, UN, USAID, and the World Bank.

2. The team's objectives were to conduct, in coordination with the government, development partners, civil society, and other stakeholders, a preliminary assessment of the damage caused by the earthquake. It also estimated the related economic implications of the event. In addition to the damage assessment, the team was asked to assess the emerging needs of the affected communities to be reflected in the medium to longer term reconstruction and recovery phases following the initial relief efforts. Thus, this assessment aims to provide decision-makers and stakeholders with a quantitative basis on which to design a comprehensive reconstruction strategy and to request assistance. Policies and priorities set out during the relief stage often influence the development of the recovery strategy.

3. The United Nations (UN) has conducted a parallel assessment with a particular focus on immediate recovery and relief needs of affected communities. To arrive at an overall cost of the earthquake which would include relief, early recovery and reconstruction costs, and in order to avoid duplication of efforts, this joint assessment includes inputs from the UN assessment on relief and early recovery. This assessment focuses on reconstruction costs and restoration of livelihoods in the most severely affected areas of Pakistan.

4. Team members visited the eight most heavily affected districts of Abbottabad, Batagram, Kohistan, Poonch, Mansehra, Muzaffarabad, Bagh, and Shangla to verify and evaluate the intensity of damage incurred during the disaster and to meet with civil administration authorities and affected people. The assessment team also met with a range of civil society, international, governmental and development partner organizations to gain an understanding of the full spectrum of issues that may influence the recovery strategy.

5. The data presented in this assessment are based on government sources, team research, and a field assessment conducted by consultants to ensure adequate coverage and verification of affected areas. It is important to note that these estimates are preliminary due to the quick turnaround time required for an

assessment of this nature and to the daily changes in data on damage and deaths, as time progresses and as relief assistance reaches affected areas.

EXECUTIVE SUMMARY

6. In Pakistan, the earthquake that struck on the morning of October 8, 2005 left widespread destruction in its wake, killing at least 73,000 people, severely injuring another 70,000, and leaving 2.8 million people without shelter. AJK and eastern NWFP were dealt the most serious blow and have suffered extensive damage to economic assets and infrastructure, with social service delivery, commerce, and communications either debilitated or destroyed. Vulnerable groups, mainly women and children living in inaccessible mountain areas with low levels of income and service provision, have borne the brunt of the earthquake's impact.

7. In addition to the enormous human toll, the earthquake and its aftermath will pose a large cost to Pakistan. The overall cost associated with the earthquake is estimated at approximately US\$5.2 billion, which includes estimated costs for relief, livelihood support for victims, and reconstruction (Table 1).

Table 1: Overall Costs of the Earthquake

| Category | US\$ Million |
|---|-------------------------|
| Relief | 1,092 |
| Death and Injury Compensation | 205 |
| Early Recovery | 301 |
| Restoration of Livelihoods | 97 |
| Reconstruction | 3,503 |
| <i>Of which Short term Reconstruction</i> | 450 |
| <i>Of which Medium/Long term Reconstruction</i> | 3053 |
| Total | 5,198 |

Note: Excludes indirect losses (income) of \$576 million - see Table 2

Sources:

Relief, Death and Injury Compensation and Early Recovery - UN Agencies

Reconstruction and Restoration of Livelihoods - ADB/WB Assessment Team

8. This report focuses on an assessment of damage and reconstruction costs. It has a companion report, entitled "Early Recovery Framework", which was led by the United Nations. These two companion reports have been coordinated to ensure consistency and facilitate coordination.

Overview of Damage and Needs

9. This report presents estimates for: (i) the loss of public and private assets (direct damage at book value) in the eight most affected districts, estimated at US\$2.3 billion, and the loss in income (indirect loss), estimated at US\$576 million (Table 2); (ii) the cost of short (up to 18 months) and medium to longer term (up to three years) reconstruction of private and public assets (at replacement costs), estimated at US\$3.5 billion (Table 2); and (iii) the cost of a livelihoods restoration program, estimated at US\$97 million.

10. The direct damage caused by the earthquake is estimated at approximately Rs. 135.1 billion (US\$2.3 billion). Private housing, with damages calculated at Rs. 61.2 billion (US\$1.03 billion), suffered the most extensive damage. The earthquake destroyed 203,579 units of housing, damaged another

196,574 and left an estimated 2.8 million people in need of shelter. Of the total housing stock, 84 percent was damaged or destroyed in AJK and 36 percent was damaged or destroyed in NWFP. The transport, education, and agriculture and livestock sectors also suffered sizable damage, totaling Rs. 20.2 billion (US\$340 million), Rs. 19.9 billion (US\$335 million), and Rs. 12.9 billion (US\$218 million), respectively.

11. The cost of reconstruction of lost assets and the restoration of services is estimated to be Rs. 208.1 billion (US\$3.5 billion). A substantial portion of these funds is on account of housing reconstruction, which will cost an estimated Rs. 92 billion (US\$1.6 billion).

Table 2: Preliminary Estimate of Total Losses and Reconstruction Costs as of November 10, 2005

| Sector | Direct Damage (Rs. mill.) | Indirect Losses (Rs. mill.) | Reconstruction Costs* (Rs. mill.) | Reconstruction Costs* (US\$ mill.) | Share of Total Reconst. Costs (%) |
|--|---------------------------|-----------------------------|-----------------------------------|------------------------------------|-----------------------------------|
| 1. Social Infrastructure | | | | | |
| Private Housing** | 61,220 | 7,218 | 92,160 | 1552 | 44 |
| Health | 7,114 | 1,378 | 18,012 | 303 | 9 |
| Education | 19,920 | 4,133 | 28,057 | 472 | 13 |
| Environment | 12 | | 8,985 | 151 | 4 |
| Public administration | 2,971 | 687 | 4,254 | 72 | 2 |
| 2. Physical Infrastructure | | | | | |
| Transport*** | 20,165 | 4,061 | 24,699 | 416 | 12 |
| Water Supply and Sanitation | 1,165 | | 1,900 | 32 | 1 |
| Irrigation | 324 | | 623 | 10 | 0 |
| Energy, power and fuel | 744 | 1,561 | 2,377 | 40 | 1 |
| 3. Economic Sectors**** | | | | | |
| Agriculture and livestock | 12,933 | 6,770 | 17,846 | 300 | 9 |
| Industry and Services | 8,578 | 8,379 | 9,178 | 155 | 4 |
| 4. Total = 1+2+3 (in Rs. Million) | | | | | |
| o/w : Azad Jammu and Kashmir | 76,375 | 17,671 | 116,625 | 1,963 | 56 |
| : North West Frontier Province | 56,436 | 16,516 | 91,467 | 1,540 | 44 |
| o/w : Public Assets | 45,795 | 12,175 | 82,187 | 1,384 | 39 |
| : Private Assets | 87,015 | 22,012 | 125,904 | 2,120 | 61 |
| o/w : Urban Areas | 25,789 | 13,675 | 46,163 | 777 | 22 |
| : Rural Areas | 107,021 | 20,512 | 161,928 | 2,726 | 78 |

Notes: * Includes cost of reconstruction of both immovable and movable assets and restoration of public services.

** Includes value of household contents such as consumer durables; reconstruction costs exclude replacement of these assets.

*** Includes roads and bridges.

**** Total losses and reconstruction costs in agriculture, industry and services are over and above what is accounted for by the sectors listed above.

12. This assessment report emphasizes the need to take into account guiding principles—including the rapid rebuilding of people’s livelihoods, independence and self-sufficiency, subsidiarity and decentralization, a focus on most vulnerable and socially disadvantaged groups, securing development gains, strengthening capacities to manage the recovery process, transparency and accountability, reducing Pakistan’s vulnerability to future disasters, encouraging the private sector and civil society engagement, and coordination and coherent approaches to recovery—during the development of a comprehensive recovery strategy.

A. BACKGROUND OF THE 2005 EARTHQUAKE

13. **Overview.** On October 8, 2005, at 8:50 PST, a magnitude 7.6 earthquake occurred in Pakistan, Afghanistan, and India. The earthquake epicenter was located 100 kilometers north-northeast of Islamabad, along a fault associated with the Indian subcontinent moving northward at a rate of about 40 mm/yr and colliding with the Eurasian continent. Tremors were felt across a wide swath of South Asia, from central Afghanistan to western Bangladesh. As of October 27th, more than 1,000 aftershocks were recorded in the India-Pakistan Kashmir region, ranging from magnitude 5.0 to 6.0.

14. The 2005 earthquake is arguably the most debilitating natural disaster in Pakistan's history. Pakistan-administered Kashmir, known as Azad Jammu and Kashmir (AJK),¹ and the eastern Districts of the North West Frontier Province (NWFP) bore the full force of the earthquake in terms of number of lives lost, injuries sustained, and destruction of infrastructure and economic assets. In at least three Districts in AJK and five in NWFP, public and private housing and shelter infrastructure, social service delivery, governance structures, commerce, and communications have been either damaged or destroyed.

15. According to Government of Pakistan figures, as of November 3, approximately 73,000 people had died and more than 70,000 had been severely injured or disabled. Over 2.8 million persons have been left without shelter, and it is estimated that about 2.3 million persons are without adequate food. Terrain in affected areas of both NWFP and AJK is highly diversified and includes densely populated as well as rugged mountainous areas comprised of small scattered rural settlements. Official estimates of damage remain conservative as more isolated communities in the earthquake affected region remain inaccessible, which foreshadows an increase in official figures as these areas are reached. Furthermore, the UN has issued a warning indicating more lives will be lost if additional relief does not materialize before the imminent onset of the Himalayan winter.

16. **The Government response.** The Government of Pakistan responded quickly to the earthquake emergency. Although communications with the most severely affected areas and populations were severed, the President and Prime Minister visited affected sites the first day after the disaster. Two Army Divisions moved into NWFP and AJK and set up five advanced staging posts for facilitation and distribution of relief goods. The geography of some affected areas has led the Government of Pakistan to call for an unprecedented number of helicopters to assist with the distribution of relief goods. As of November 2, a fleet of more than 125 helicopters and aviation vessels, both foreign and domestic, have made over five thousand sorties to affected areas.

17. A President's Relief Fund has been established to mobilize resources for relief efforts. The Prime Minister has outlined a 12-point national strategy for reconstruction and rehabilitation. The Prime Minister's office has appointed a Federal Relief Commission and corresponding Relief Coordinator, with the overall responsibility for overseeing relief efforts targeting shelter, food, clean water and immediate medical care. At the District and grassroots levels, military relief personnel have been stationed to facilitate the distribution of relief goods. Furthermore, the President has established an Earthquake Reconstruction and Rehabilitation Authority (ERRA) to facilitate the rebuilding and repair of damaged infrastructure, including housing, roads, bridges, government buildings, schools and hospitals.

18. As of November 11th, the Government of Pakistan had distributed 350,000 tents, 3.2 million blankets, 3,000 tons of medicine, and established tent villages for earthquake-affected persons. The Government has made available army medical teams comprised of medical officers and paramedics in at least thirteen stations in and around affected districts of AJK and NWFP. The Government has also

¹ Azad Jammu and Kashmir (AJK) is the Pakistan-administered portion of an area over which India and Pakistan have been in dispute since 1947. The assessment team does not intend to make any judgment as to the legal or other status of any disputed territories or to prejudice the final determination of the parties' claims.

announced a program that includes compensation of Rs. 100,000 for families who have lost members, Rs. 50,000 for those individuals who have sustained serious injuries, and Rs. 25,000 for those with minor injuries. The maximum amount of assistance given to each family under this program is Rs. 500,000, and disbursements have already begun.

19. **Civil society response.** A ‘nation united’ characterizes the strong civil society response throughout Pakistan and among expatriates living abroad. Small self-help groups have been formed in many of the affected areas and are being supported by tens of thousands of people throughout Pakistan who are collecting relief goods, often at the neighborhood level. A host of international and local Non-Governmental Organizations (NGOs) are working to provide emergency relief in affected areas, including the Edhi Foundation; Islamic Relief; Red Crescent Society; Citizen’s Foundation; Mir Khalil-ur-Rahman Foundation; World Vision; Agha Khan Foundation; Save The Children; Oxfam; and the Rural Support Program Network. Individuals have donated millions of dollars towards relief efforts, often through the President’s Relief Fund and civil society organizations working in the affected areas. A number of expatriate Pakistanis and academics have designed a web-based relief and information system that complements Government web-based initiatives. In total, civil society has mobilized nearly Rs. 6 billion (US\$100 million) in donations and has provided clothing, temporary shelter, food, medicines and other in-kind items and services to the victims.

20. **International community response.** The Government of Pakistan requested international assistance, which started arriving within days of the earthquake. As of November 11th, according to Government reports, assistance totaling nearly US\$2.5 billion has been pledged by a total of 83 bilateral as well as multilateral donors, with many also providing significant in-kind support including logistical and manpower assistance to the relief efforts. Major contributions have been pledged by Saudi Arabia, USA, Japan, Turkey, Kuwait, United Arab Emirates, UK, Canada, Iran, Norway, Germany, China, Netherlands, Switzerland, India, Sweden, Denmark and Australia. Other donors include Italy, France, Ireland, Finland, Oman, Belgium, South Korea, Ukraine, Luxembourg, Austria, Algeria, Malaysia, Greece, and others. The World Bank approved supplemental financing of US\$200 million within weeks of the earthquake to help the Government meet emergency expenditure requirements. The United Nations immediately deployed its Disaster Assessment and Coordination (UNDAC) Team to provide technical assistance to assess the scale of the disaster and help manage the international response. The United Nations Development Programme (UNDP) is helping coordinate relief efforts at both national and local levels. Other UN specialized agencies such as United Nations Children’s Fund (UNICEF), the World Food Programme (WFP), and the United Nations Population Fund (UNFPA) have also provided emergency relief assistance.

21. On October 26th, the Secretary-General of the United Nations hosted a Ministerial-level international donors’ conference in Geneva to discuss Pakistan’s short term relief assistance requirements. The UN launched a flash appeal of US\$550 million as immediate relief assistance to Pakistan. About US\$140 million has been earmarked for an emergency push to feed and provide shelter to those affected. The Geneva conference is being followed by another multi-donor event in Islamabad, scheduled for November 19, 2005, aimed at boosting resources for the medium to longer term reconstruction and rehabilitation programs.

22. **Private sector response.** The private sector has shown generous support to the earthquake affected population, with donations ranging from cash assistance to business services. For example telecommunication companies were quick to provide telecommunication services in the affected areas in order to ensure smooth relief operations. They also set up free public call offices and started fundraising drives. International and national courier services used their logistics expertise to ensure that incoming international relief supplies arriving on chartered flights were handled as quickly and efficiently as possible. Some companies have also launched ‘adopt a village’ schemes.

23. Despite these positive responses to the disaster, it is important to note that a significant financing gap remains, which must be addressed in order to minimize further economic and social setbacks to the people of Pakistan.

B. CONDITIONS IN AFFECTED AREAS BEFORE THE EARTHQUAKE

24. The area most heavily damaged by the earthquake incorporates AJK and the eastern Districts of NWFP. This region is home to a scattered population of some 5.7 million people. The social structure in this region is closely-knit, and families on average comprise 7 people per household. About 88 percent of residents live in hilly, mountainous rural settlements, which range in size from 2 households to more than 300. The region's population is relatively young: nearly half (42 percent) of the population is below the age of 15 years, while 6.7 percent of the population is above the age of 60. A high proportion of the population lacks basic services and facilities like clean drinking water and safe disposal of waste. The region is also an area of extreme environmental vulnerability, characterized by frequent landslides and unchecked urban development with few environmental safeguards.

25. Agriculture and livestock rearing are the primary sources of employment in rural areas. Most rural residents engage in subsistence agriculture, with agriculture accounting for 60 to 70 percent of total household income and 37 percent of total rural employment. Public administration accounts for a significant proportion of employment in the affected urban areas; followed by small trading and businesses, construction and transport, mostly in the informal sector. Employment in public administration is especially prominent in AJK, and agriculture conversely employs a higher fraction of the rural population in NWFP. Notably, for all affected areas, remittances from migrant male family members are a vital source of income. Options for women to become employed outside of the household are very limited, even though, due to labor migration, the proportion of women-headed households is fairly high. In AJK, for instance, approximately 20 percent of households are headed by a female.

26. Overall, the private sector in the affected areas is largely dominated by medium, small-scale and unregistered enterprises, often household-based. The region's manufacturing and financial sectors are small and offer few employment opportunities. Mounting population pressures and land fragmentation have overburdened subsistence agriculture, spurring widespread seasonal migration to urban centers and abroad. Remittances are thus an important source of income and account for approximately a quarter of household's consumption expenditure, even for the poorest quintiles in AJK and NWFP.

C. GUIDING PRINCIPLES OF THE NEEDS ASSESSMENT AND RECOVERY STRATEGY

27. Moving from the relief phase toward comprehensive recovery that meets the needs of the affected population requires a common framework, to be adopted by all organizations and institutions involved, to ensure speed, consistency and equity across rehabilitation efforts. The following guiding principles were formulated by the international development partners and outline key areas that may be shared and adhered to by all parties when planning and implementing recovery activities. The ADB-World Bank joint assessment team has used these ten points as a basis for its analysis in the needs assessments and proposed recovery strategies by sector.

- ***Rapid rebuilding of people's livelihoods.*** Accelerate the revitalization of the local economy – revival of production, trade and the creation of income and employment opportunities in support of people's own initiatives.
- ***Independence and self-sufficiency.*** Maximize use of local initiative, resources and capacities. Base planning and execution on local knowledge, skills, materials and methods, and enterprise,

taking into account the need for affordable solutions. Ensure community participation in all aspects of the recovery process and partner with local institutions.

- ***Subsidiarity and decentralization.*** Take decisions on plans, design and implementation at the lowest level possible, to ensure community ownership and empowerment, and to ensure solutions are locally appropriate.
- ***Focus on the most vulnerable and socially-disadvantaged groups, such as children, women, and the disabled.*** Disasters increase the vulnerability of all, but especially of those who are already disadvantaged. Recovery programming needs to give priority to the most vulnerable groups, including female-headed households, children and orphans, and the poor, and take account of those with special needs, to avoid their being overlooked.
- ***Secure development gains and progress in poverty reduction.*** Disasters can reverse hard-won gains in poverty reduction and development, risking a downward spiral of decline. Recovery planning must attempt to re-establish and secure previous development gains. In addition, the poor in areas not affected by the disaster (the vast majority in the case of Pakistan) should not lose out due to increased allocation of public resources to the earthquake-affected areas at the expense of the rest of the country. Ensuring the dual objectives of rehabilitating and rebuilding earthquake affected communities and accelerating Pakistan's development will require additional resource mobilization by Pakistan and the international community.
- ***Restoring capacities to manage the recovery process.*** The capacity of local public administration, including infrastructure, must be rebuilt. Along with local and national institutions, encourage and empower all levels of civil society to participate in and manage the recovery process.
- ***Transparency and accountability.*** Achieve accountability through ensuring the effective operation of the judicial system. Achieve transparency through open processes and wide dissemination of information on all aspects of the recovery process.
- ***Avoid the creation of new disaster risks.*** While avoiding radical redesign and restructuring of neighborhoods and towns, ensure that sensible and realistic measures are taken to achieve development progress, protect the environment, and reduce future disaster risks.
- ***Encourage engagement of private sector and civil society.*** Mobilize private investment – both human and financial. Ensure the local private sector has incentives and technology to participate fully in reconstruction and that financial and human contributions from companies and individuals, as well as wider Pakistani diaspora beyond Pakistan, are harnessed.
- ***Coordinated and coherent approaches to recovery.*** Ensure full and effective coordination among all involved agencies based on comprehensive information exchange, flexibility in administrative procedures, surveillance of any rent-seeking activity during implementation, and uniformity of policies.

D. PRELIMINARY DAMAGE AND NEEDS ASSESSMENT

28. This section presents the methodology utilized to conduct the overall assessment as well as the damage and needs estimates for the following sectors: social and environmental aspects, housing,

livelihoods, agriculture, transport, education, health, water supply and sanitation, energy, governance and institutions, and the industry and services.

29. **Methodology.** The impact of the earthquake on each sector of the economy includes the following three costs: (i) Direct Damage; (ii) Indirect Losses; and (iii) Reconstruction Cost. *Direct Damage* refers to the monetary value of the completely or partially destroyed assets, such as social, physical and economic infrastructure (including final goods, goods in transit or process, raw materials, materials and spare parts), immediately following an earthquake. Wherever possible, the direct damage for assets is assessed in “as was” condition, i.e., at their book values (see Box 2 in Annex 1). *Indirect Losses* are income losses, and comprise both the change of flow of goods and services and other economic flows such as increased expenses, curtailed production and diminished revenue, which arise from the direct damage to production capacity and social and economic infrastructure. *Reconstruction Costs* measure the cost of rebuilding lost assets and restoring lost services. It is generally assessed at the replacement cost, and in the case of this report, it is defined to include the additional costs incurred for earthquake resistance.

30. The macroeconomic impact highlights ways in which the disaster may alter the country’s main economic variables, including on the rate of economic growth, balance of payments and current account, and inflation.

31. A rapid multi-sector data collection exercise was undertaken by the team to facilitate a comparative pre- and post-earthquake assessment of the infrastructure and services affected. Data were collected by a combination of multi-sector field assessments, desk reviews, aerial reconnaissance, site visits by sector specialists, and interviews with stakeholders. Given the diverse nature of available pre-earthquake baselines, and the post-earthquake datasets, four key principles were established to ensure timely availability of consistent data for all the sectors.

32. The key principles were as follows: (i) for each District, coordinate with District Officials and the Army’s Support Network in the District to ensure that they can provide an overview and facilitate data collection from as many reliable sources (both in the district and elsewhere) as possible; (ii) use sector experts familiar with the affected areas pre-earthquake, expose them to post-earthquake conditions through rapid aerial reconnaissance and ground missions, and then use them to help identify the final, reliable datasets to be used for each sector; (iii) ensure that pre-earthquake data are time-normalized across the various sectors to reflect the best possible baseline for 2005 – e.g., a lot of the pre-earthquake data were available from the last Census, but the last Census provided 1998 baseline data which had then to be projected based on reasonable assumptions to 2005; and (iv) close the post-earthquake data collection at a convenient point in time so that consistent analysis and post earthquake needs assessment could be carried out. Thus, the preliminary assessment report is based on a comprehensive dataset with several plausibility reviews incorporated.

33. The field survey team was comprised of one assessment consultant per affected District (eight districts were included: Abbottabad, Shangla, Mansehra, Batagram, and Kohistan in NWFP; and, Bagh, Muzaffarabad, and Poonch in AJK).² Each assessor travelled through the affected District, collected multi-sectoral data, and cross referenced all information available from the line agencies at the provincial and district levels and from other organizations working on the relief efforts in the affected Districts. While the assessors were in the field, they constantly consolidated the data and transmitted them by facsimile to the data consolidation team in Islamabad. The team in Islamabad reviewed the collected data in real time and sent additional queries (as required) to the assessors in the Districts to ensure that inconsistencies could be clarified and further details requested where required.

² While these eight Districts were the most severely affected, other Districts suffered damage, including: Malakand, Buner, Swat, and Haripur.

34. Final data consolidation was performed in Islamabad, and upon consolidation, quantitative and qualitative pre- and post-earthquake data were developed. Data were checked for consistency and plausibility as well as updated as information and clarifications were received from stakeholder agencies through October 26, 2005. In parallel, the aerial reconnaissance of the entire affected area was undertaken by the sector teams between October 25 and October 26 to revalidate the data and to assess the nature of the damage in the affected areas. Comments and new data were received from the Government during the week of November 7, which were used to update estimates of losses and reconstruction costs.

Social Aspects

35. The rising death toll in the aftermath of the October 8th earthquake has had a serious impact on the population and social structures of the earthquake-hit areas. The main victims were already vulnerable groups, living in comparatively inaccessible mountain areas with lower levels of income and service provision as compared to the national average. Due to difficulties in access, many victims were not rescued and treated in time, and succumbed to their injuries.

36. **Unattended children.** With the number of unattended children unknown, special protection is required for this group. Top priorities include family reunification in the case of separated children, the provision of culturally-sensitive interim and alternative care options, and the protection of children's legal rights.

37. **Single-headed households.** The loss of a mother has a negative physical and psychological impact on small children, while the loss of the male head of family constitutes a serious economic blow since there are limited economic options for women outside the household. The prevalent social norms do not encourage the growing numbers of widows, single women, and women-headed households to access relief and go to the tent camps outside their local area since they will be among unrelated men. Likewise, medical teams find it difficult to access injured women unless they have female staff. Privacy for displaced women and girls is thus an important consideration.

38. **Legal rights.** Since women in many of the affected areas customarily relinquish their claims to joint family property, the risk of widows and female orphans losing their rightful inheritance is considerable in the present situation, where traditional mechanisms of social support may be destroyed. Restoring lost records of property rights to housing, commercial property, and land should be launched as soon as possible, with special assistance given to vulnerable groups, such as widows and orphans.

39. **Disabled.** Disabled, elderly, and other vulnerable groups will be disadvantaged in accessing relief and warrant special consideration. Specific measures are required to address the needs of the large numbers of injured people who will be permanently disabled due to severe injuries, such as injuries to the spinal cord, head and limbs. This will require the development of mechanisms to provide long term care where needed, as well as support for rehabilitation, employment and skills development for people with disabilities. Reconstruction efforts should take into account the need to ensure that rebuilt facilities, especially schools, health facilities, and public offices, are accessible to people with disabilities.

40. **Psychological shock and trauma.** Severe shock and trauma are widespread among the affected population in the earthquake's aftermath. Psycho-social support is therefore needed for surviving family members, particularly widows, single-parent children, orphans, and the elderly.

41. **Community participation.** The involvement of communities will be essential to preserve existing social networks that form the basis of support among affected households. Local communities will need to be actively involved in the decision-making and implementation of reconstruction activities.

Environmental Aspects

42. Although the dominant losses were sustained to humans and structures, the earthquake has also resulted in adverse impacts on the environment. The impact on ecosystems is often less dramatic than structural damage, due to the relatively slower manifestation of ecosystem damage. But considering that the environment of the affected area was vulnerable before the earthquake and comprises fragile mountain ecosystems, significant long term impacts may be likely. A detailed environmental assessment of the impacts of the earthquake will be needed to quantify losses to forestry, aquatic and terrestrial ecosystems, including biodiversity, and to restore damaged ecosystems.

43. Environment is intricately linked to the livelihoods of the affected communities because of their dependence on natural resources. Environment and natural resource issues must therefore be an integral part of all sectoral plans for reconstruction and recovery. While the country had little control over the negative environmental impacts from the earthquake, it can influence preventive environmental and natural resource impacts of reconstruction.

44. **Rubble and debris disposal.** One of the most visible consequences of the earthquake is the enormous quantity of debris and rubble resulting from damaged and destroyed structures. Preliminary estimates indicate that up to 200 million tons of rubble may need disposal. Therefore, a rubble and debris management plan that encourages reuse and recycling of rubble, as well as identifies suitable disposal sites for the remaining refuse, is urgently needed to prevent haphazard dumping of rubble and its associated adverse environmental impacts.

45. **The natural environment.** The main environmental impacts of the earthquake were the result of landslides. While the exposed soil surfaces presently appear to be in a state of dry equilibrium, a second phase of landslides is likely, and is largely unpreventable due to the onset of rain and the melting of spring snow. The denudation of forest cover over the last decade due to encroachment, illegal timber felling and agriculture likely exacerbated the adverse impacts of the landslides. This risk continues today as the timber demand for reconstruction could result in further denudation of forests.

Economic Impact

46. **Direct damage.** Preliminary estimates of the direct damage sustained due to the earthquake total Rs. 135.1 billion (US\$2.3 billion), as presented below in Table 2. These estimates are based on the book value of the assets. The largest component of this damage is to private housing, which amounts to Rs. 61.2 billion (US\$1.03 billion), followed by damage to the transport sector totaling Rs. 20.2 billion (US\$340 million), and to the education sector equaling Rs. 19.9 billion (US\$335 million). Direct damage to agriculture and livestock is also sizeable, totaling Rs. 12.9 billion (US\$218 million). The losses to industry and services amount to Rs. 8.6 billion (US\$144 million).³

47. The level of direct damage is higher in AJK than in NWFP. For AJK, it amounts to Rs. 76.4 billion (US\$1.3 billion) and for NWFP, Rs. 56.4 billion (US\$950 million). In most sectors, the destruction of physical assets in AJK is higher than in NWFP, as is its monetary value.

48. **Indirect losses.** The indirect losses resulting from the direct damage are Rs. 34.2 billion (US\$576 million). The indirect losses are comparable in absolute values between NWFP and AJK. The

³ The direct damage to services and industry includes destruction of physical assets in wholesale and retail trade, hotels and restaurants and banking sector. Damage to the private sector health organizations is not included.

estimated indirect losses do not take into account the effect of rehabilitation and reconstruction activities on future output. Reconstruction will lead to not only restoration of physical assets, but also flows of production of goods and services. Hence, the estimates of indirect losses presented above are likely to be on the higher side for output losses.

Table 2: Preliminary Estimate of Total Losses and Reconstruction Costs as of November 10, 2005

| Sector | Direct Damage (Rs. mill.) | Indirect Losses (Rs. mill.) | Reconstruction Costs* (Rs. mill.) | Reconst. Costs* (US\$ mill.) | Share of Total Reconst. Costs (%) |
|--|------------------------------|--------------------------------|--------------------------------------|---------------------------------|-----------------------------------|
| 1. Social Infrastructure | | | | | |
| Private Housing** | 61,220 | 7,218 | 92,160 | 1552 | 44 |
| Health | 7,114 | 1,378 | 18,012 | 303 | 9 |
| Education | 19,920 | 4,133 | 28,057 | 472 | 13 |
| Environment | 12 | | 8,985 | 151 | 4 |
| Public administration | 2,971 | 687 | 4,254 | 72 | 2 |
| 2. Physical Infrastructure | | | | | |
| Transport*** | 20,165 | 4,061 | 24,699 | 416 | 12 |
| Water Supply and Sanitation | 1,165 | | 1,900 | 32 | 1 |
| Irrigation | 324 | | 623 | 10 | 0 |
| Energy, power and fuel | 744 | 1,561 | 2,377 | 40 | 1 |
| 3. Economic Sectors**** | | | | | |
| Agriculture and livestock | 12,933 | 6,770 | 17,846 | 300 | 9 |
| Industry and Services | 8,578 | 8,379 | 9,178 | 155 | 4 |
| 4. Total = 1+2+3 (in Rs. million) | 135,146 | 34,187 | 208,091 | 3,503 | 100 |
| o/w : Azad Jammu and Kashmir | 76,375 | 17,671 | 116,625 | 1,963 | 56 |
| : North West Frontier Province | 56,436 | 16,516 | 91,467 | 1,540 | 44 |
| o/w : Public Assets | 45,795 | 12,175 | 82,187 | 1,384 | 39 |
| : Private Assets | 87,015 | 22,012 | 125,904 | 2,120 | 61 |
| o/w : Urban Areas | 25,789 | 13,675 | 46,163 | 777 | 22 |
| : Rural Areas | 107,021 | 20,512 | 161,928 | 2,726 | 78 |

Notes:

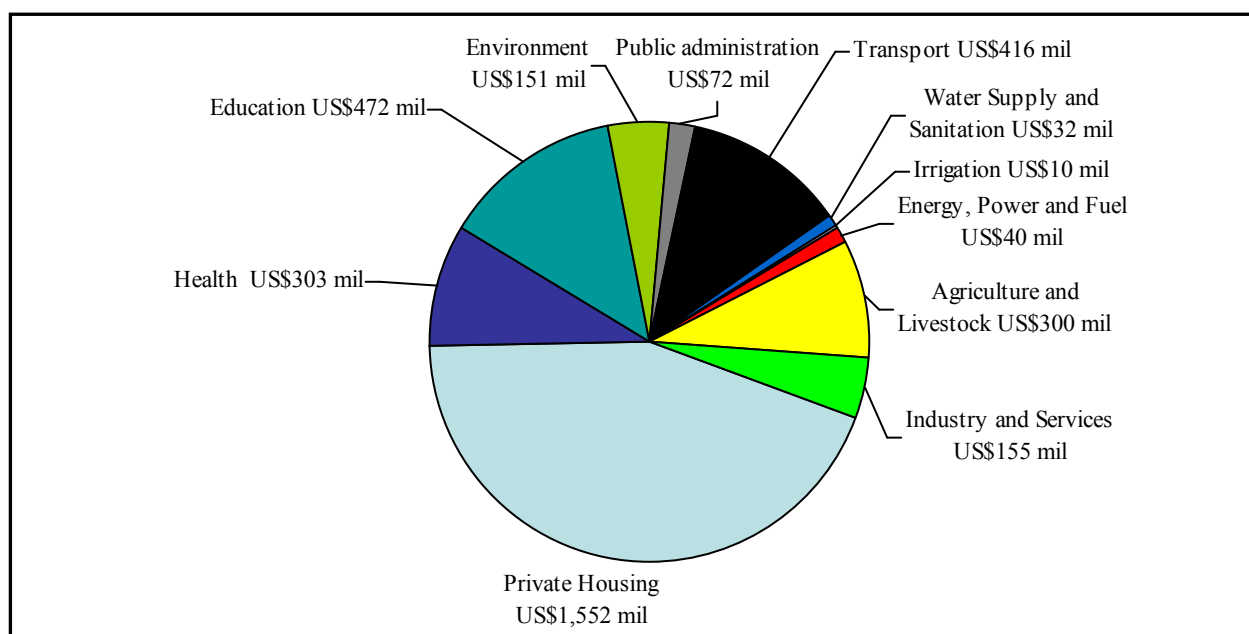
* Includes cost of reconstruction of immovable assets and restoration of public services.

** Includes value of household contents such as consumer durables; reconstruction costs exclude replacement of these assets.

*** Includes roads and bridges.

**** Total losses and reconstruction costs in agriculture, industry and services are over and above what is accounted by the sectors listed above.

49. **Reconstruction costs.** The cost of reconstruction of lost assets and of the restoration of public services is estimated to be Rs. 208 billion (US\$3.5 billion). A breakdown of reconstruction costs by sector is presented below in Figure 1. The reconstruction costs are valued at improved standard replacement rate, including the cost of rebuilding to earthquake resistant standards in a manner suitable to local conditions. This is necessary given the high degree of exposure to natural disasters in the affected areas.

Figure 1: Reconstruction Cost by Sector (Total: Rs. 208 bn; US\$3.5 bn)

Macroeconomic Effects

50. **Real sector.** The impact of the earthquake on Pakistan's official GDP (which excludes GDP from AJK) is expected to be relatively small, in the order of 0.4 percent.⁴ Pakistan's official GDP growth for FY06 was projected by the Government of Pakistan in June at 7 percent. However, recent crop data on cotton and sugarcane suggest that growth will be around 6.5 percent. The additional impact of the earthquake is likely to bring output growth further down, to around 6.2 percent, due to a projected reduction in NWFP output for FY06.⁵

51. **Fiscal impact.** At the macroeconomic level, the most significant impact of the earthquake is expected to be on the fiscal deficit of the Government of Pakistan. In the absence of any offsetting revenue increases and expenditure reductions, the earthquake is projected to increase the FY06 deficit of the Government of Pakistan by 0.6 to one percent of GDP. The Government has expressed its commitment to a sustainable fiscal stance and to continued debt reduction; it is expected that it will announce measures to mitigate, at least partially, the negative fiscal impacts of this shock. NWFP's and AJK's budgets will be unable to accommodate a significant share of the relief and reconstruction expenditure, although it is to be expected (and desirable) that they would have significant role in the reconstruction process.

52. **External sector.** There have been pressures on the external sector arising from strong aggregate demand and factors not directly related to the earthquake. The earthquake may cause an increase (albeit limited) in imports of fuel, food, and construction materials. A delay in aid inflows to finance GoP earthquake expenditures would aggravate pressures on the balance of payments.

⁴ This assumes that all of the income loss will fall in fiscal year 2005/06, an assumption that may overstate the impact of the earthquake on growth.

⁵ When AJK's estimated GDP is added to Pakistan's overall output and to GDP losses, the impact of the earthquake rises to 0.7 percent.

53. ***Sustaining rapid growth and poverty reduction while launching the earthquake recovery.*** The earthquake has now created additional expenditure needs for relief, reconstruction, and rehabilitation cost. These pressures could pose difficulties for Pakistan's macroeconomic balances and may undermine the achievement of its long term development goals, unless additional concessional financing is made available by the international community. A key element of Pakistan's PRSP is the utilization of the additional fiscal space created by prudent fiscal policy and aid to meet development and poverty alleviation objectives. It is, therefore, important that priority public expenditures be protected, so that Pakistan can continue to improve service delivery of health, education, and public infrastructure. The Government has indicated that it would be prepared to absorb a part of the budgetary impact of the earthquake by making cuts in low-priority expenditures and raising additional domestic revenue. These adjustments would be needed irrespective of the amount and type of financing that the donor community would provide. However, given the magnitude of resources for rehabilitation of the affected areas, it is unlikely that the Government will be able to fully absorb the fiscal impact of the earthquake without significantly affecting public sector development activities.

Sector by Sector Analysis

54. This section gives an overview of the damage and recovery needs by sector. Detailed assessments of each sector are provided in the attached annexes.

55. ***Housing. (a) Damage – Rs. 61.2 billion (US\$1.03 billion).*** Across AJK and NWFP, the earthquake destroyed 203,579 housing units, while 196,574 were damaged to various degrees. These include 116,572 destroyed and 88,368 damaged in AJK, and 87,007 destroyed and 108,205 damaged in NWFP. Losses to the housing sector represent 84 percent of the total housing stock in the affected Districts of AJK, and 36 percent of housing stock in the five affected Districts of NWFP. The affected houses are predominantly rural, with urban units accounting for only 10 percent of the total. Much of the rural housing is located on steep slopes, causing difficulties in access.

56. ***(b) Reconstruction needs and strategy – Rs. 92.2 billion (US\$1.55 billion).*** The reconstruction strategy for the housing sector is underpinned by the following nine principles: (i) promote hazard-resistant construction standards and designs; (ii) rebuild in-situ; (iii) ensure rebuilding is owner-driven; (iv) rebuild with familiar methods and easily accessible materials; (v) relocate settlements only when necessary; (vi) ensure urban replanning is limited and strategic; (vii) offer uniform assistance that is not compensation-based; (viii) coordinate multiple reconstruction initiatives and standards for equity; and (ix) link housing to livelihoods and infrastructure rehabilitation. The above cost estimates have been developed on the basis of one feasible design alternative, however other structural design options may also be appropriate based on local conditions, affordability, and seismic-resistant building standards.

57. In the short term, in addition to addressing the immediate sheltering needs of the affected population, the Government should begin preparing for the longer reconstruction phase. With the onset of winter, reconstruction activities could be reduced to a minimum, particularly in areas above the snowline. During this time, it will be important to undertake the following activities in preparation for reconstruction: (i) determine losses for establishing a baseline and eligibility levels; (ii) undertake seismic and soil investigations, particularly in the most affected areas; (iii) conduct training for safe construction techniques; (iv) disseminate information on available assistance packages and seismic-resistant designs; and (v) establish property rights. The reconstruction effort for permanent housing would predominantly begin in the spring with the provision of hazard-resistant housing for affected population through cash grants for basic housing assistance, beneficiary identification with compensation levels, and urban planning and development initiatives.

58. ***Livelihoods. (a) Overview.*** While the rest of the damage assessment captures the quantity of damage in terms of lost assets and outputs, the assessment of livelihood losses focuses on estimating the

impact on employment. Estimates show the total loss in employment to be around 324,000 jobs, or about 29 percent of the employed population (above age 10) in the affected Districts. About 38 and 25 percent of the total employment in the affected Districts of AJK and NWFP, respectively, are estimated to be lost. The largest job losses are in agriculture, small businesses/shops, and construction, while no employment loss is assumed for migrant workers and public sector employees. Employment losses will likely impact nearly 1.6 million people.

59. **(b) Recovery needs – Rs. 10.3 billion (US\$172 million, or US\$97 million, net of food).** Addressing the short term needs of this vulnerable population for a period of six months, assuming that food requirements are fully met through a continuing relief program described in the next paragraph, will notionally require an additional Rs. 3.5 billion (US\$59 million), but if basic food requirement is also included in the estimate, the amount will increase to Rs. 8 billion (US\$134 million). In addition, an estimated Rs. 2.3 billion (US\$38 million) will be needed for a recommended one-time grant to micro-entrepreneurs to help them rebuild lost assets.

60. The livelihood support strategy should also seek to rejuvenate economic activity in affected areas through reviving small businesses and trades, livestock and agriculture, and creating employment opportunities for those who are now permanently disabled. A short term option would be providing cash grants to affected families in the form of a monthly support of a recurrent, fixed amount. In addition, cash for work programs may be effective in generating temporary employment for those who are able and willing to work at an appropriate wage. Generating sustainable livelihoods in this post-disaster situation also critically requires providing access to finance, perhaps on soft or concessionary terms, to affected small/micro entrepreneurs and livestock owners. The high incidence of severe injuries, many of which may lead to permanent disabilities, also suggests the need for a strategy to rehabilitate and re-train such individuals as part of medium to long term recovery efforts, as mentioned above.

61. **Agriculture, Livestock and Irrigation. (a) Damage – Rs. 13.3 billion (US\$223 million).** Based on data from the UN FAO team and information from concerned government officials, the earthquake severely damaged crops, livestock and irrigation subsectors in both AJK and NWFP. Direct damage to crops includes loss of harvested and standing crops, disruption of terraces and soil conservation structures, spoilage of stored grains and animal feed, and structural damage and destruction to extension and research buildings amounting to Rs. 4.0 billion (Rs. 3.2 billion in AJK, Rs. 0.75 billion in NWFP). The indirect damage of Rs. 712 million (Rs. 529 million in AJK and Rs. 183 million in NWFP) represents value of wheat productivity losses in the coming *rabi* season and amortized value of fruit production. The direct damage to the livestock subsector equals about Rs. 9 billion, which is accounted for by the loss of large and small ruminants and poultry, animal sheds, and damage to extension and research buildings. The indirect losses to the livestock sector, mainly loss of milk productivity, are estimated at Rs. 6 billion (US\$102 million). The main damage to the irrigation subsector has been to the water channels, diversion structures, water lifts, spillways, and water tanks, amounting to Rs. 324 million (Rs. 240 million in AJK and Rs. 84 million in NWFP).

62. **(b) Recovery needs – Rs. 18.5 billion (US\$311 million).** The immediate requirements in the next month are for winter crops, mainly wheat cultivation, construction of temporary animal sheds for protection from severe cold, and repair of water channels. If support for wheat cultivation is not extended in time, the affected persons will be unable to grow wheat, which is their main staple. Similarly, if shelter for animals is not provided immediately, there will be substantial loss of the remaining livestock inventory. These needs would require an immediate support of Rs. 3.3 billion (US\$56.5 million). In the short term, Rs. 1.9 billion would be required for the restoration of the relevant line agencies' buildings and rehabilitation of irrigation facilities. In the medium term support would be needed for replanting fruit trees, rebuilding terraces, replenishment of livestock inventory, rehabilitation of productive infrastructure, and reconstruction of laboratories, offices of extension and research for agriculture, livestock, and irrigation departments. Over the longer term the focus should be on restoring livestock inventories and

rehabilitation of terraces and soil conservation infrastructure that have been severely damaged. It is necessary to reestablish the agricultural sector in a sustainable manner through strengthening institutional capacities and providing support services.

63. **Transport. (a) Damage – Rs. 20.2 billion (US\$340 million).** Damage to the mountainous roads in AJK and NWFP is largely due to landslides precipitated by the earthquake, but the intensity of the damage varies. In AJK, it is estimated that 2,366 km roads were damaged. Of this 203 km are major roads, 761 km are other paved roads, and 182 km are unpaved shingled roads for a total of 1,146 km representing 45 percent of all Public Works Department (PWD)-managed roads. These include the Neelam Valley road, and to a lesser extent the Jehlum Valley road, which are the primary transport arteries in AJK. Another 1,220 km of local unpaved roads are damaged, representing 44 percent of the total Local Government and Rural Development (LGRD) roads in the affected districts. Damage in AJK is estimated at Rs. 9.2 billion (US\$155 million). In NWFP, 2,063 km of roads were damaged, representing 31 percent of the total road network in the affected Districts. Of this amount, 652 km comprise provincial highways managed by FHA, 1,016 km are paved provincial roads that were devolved to the Districts, 367 km are unpaved district roads, and 27 km are urban roads managed by municipal agencies. The estimated damage in NWFP is about Rs. 7.49 billion (US\$124 million).

64. The damaged length of the three national highways that provide main access to the northern areas of NWFP is about 194 km, representing 72 percent of the total length. The estimate of assessed damage to the national highways is Rs. 3.5 billion (US\$59 million).

65. **(b) Recovery needs – Rs. 24.7 billion (US\$416 million).** Immediate needs include: (i) the removal of landslide debris and the reopening of roads to traffic; (ii) restoration of roads and bridges; (iii) stabilization of road embankments to withstand the oncoming snow; (iv) comprehensive condition surveys of all damaged roads to plan and prioritize the reconstruction and recovery works; and (v) reconstruction of unpaved local roads using labor-based appropriate technology methods employing communities and individuals to create livelihood opportunities. Short term activities include: (i) planning and engineering design; (ii) bidding of the priority damaged paved roads; and (iii) mobilizing for construction. A total of Rs. 5.1 billion, or US\$86 million, will be needed for this phase. Medium to longer term recovery efforts include: (i) continuation of the bidding for the remaining damaged paved roads; (ii) supervision and monitoring of the ongoing reconstruction works; (iii) stabilization of the roadside slopes damaged by landslides and potential landslide areas; and (iv) review and improvement of design standards. A total of Rs.19.6 billion, or US\$330 million, will be required for this phase.

66. **Education. (a) Damage – Rs. 19.9 billion (US\$335 million).** About 7,669 schools were affected, ranging from primary schools to institutions of higher education and including both government-owned and privately-owned schools. Approximately 5,690 of the damaged schools are primary and middle schools. About half of the damaged school structures collapsed or are beyond repair and will need to be rebuilt. In addition to damages to educational institutions and offices, the education sector has also experienced severe human losses, including students, school teachers, and staff. According to preliminary estimates, about 18,095 students and 853 teachers and educational staff died across NWFP and AJK. The deaths of teachers represent not only losses to the teaching force, but also a loss of government investment in teacher capacity development through training. A substantial number of teachers, staff, and students may also suffer from emotional trauma and injuries, which could limit their capabilities.

67. **(b) Recovery needs – Rs. 28.1 billion (US\$472 million).** The most urgent requirement of the education system is to resume classes at all levels. This would entail the provision of temporary and semi-permanent alternative learning spaces, the repair of partly damaged schools, the provision of learning materials, the training of teachers to replace those who have perished, and the revival of education administrative structures. These short term measures are estimated to cost Rs. 1.2 billion. Over the medium to long term, destroyed schools will need to be rebuilt. This will involve the construction of

new schools with seismic-resistant strengthening, classrooms, facilities, latrines and water supply, and the provision of learning materials, furniture, and equipment. Partly damaged schools will also need to be repaired, and continued teacher training will be required over the medium term. A substantial number of students in these areas may now have special learning needs that would additionally require new teaching approaches and school design modifications for improved accessibility of the disabled.

68. **Health. (a) Damage – Rs. 7.1 billion (US\$120 million).** The immediate need is to treat the more than 70,000 people with injuries. The earthquake's impact on the health sector also includes severe damage to health infrastructure and health systems. About 574 health facilities have been partially damaged or destroyed. Furthermore, there have been 21 confirmed deaths and 141 injuries sustained to staff, with incomplete information regarding the Lady Health Workers (LHW) residing among the affected communities. Many surviving staff members in the earthquake affected areas are away from work due in part to psychological trauma and to their assistance to family members in finding shelter and rebuilding houses. Moreover, health management was paralyzed at the central level in AJK, district, and at the facility level. These losses have resulted in a complete breakdown of the health system and a total disruption of both secondary and primary care service provision.

69. Based on available information, the total damage to the health sector is estimated at approximately Rs. 7.1 billion. This figure does not include the cost of damage to private health care system and indirect losses due to expenditure on treatment of survivors, public health interventions, loss of health staff and the impact of psychological trauma, which have not been computed.

70. **(b) Recovery needs – Rs. 18 billion (US\$303 million).** The reconstruction and recovery strategy could be carried out in two overlapping phases. In the short term, the most urgent need is to ensure access to an essential health care package that reduces vulnerabilities and saves lives as the system is revitalized. The immediate focus needs to be on the revitalization of the primary health care system, the provision of services in tented villages and for the newly disabled, and psychological care for survivors and health care workers. The estimated short term cost is Rs. 7.2 billion. In the medium term, all levels of health facilities, including secondary care hospitals, will need to be reconstructed and re-equipped. The health system management should be strengthened and the disabled should undergo community-based rehabilitation. The medium term plan should also consider developing and putting into place an epidemiological surveillance, emergency preparedness, and disaster relief system for the health sector. The estimated cost of the medium to longer term recovery plan is Rs. 10.8 billion.

71. **Water Supply and Sanitation. (a) Damage – Rs. 1.2 billion (US\$20 million).** In NWFP, preliminary estimates suggest that as a result of the earthquake, up to 77,500 households could be affected by disruptions to partially damaged or destroyed water supply schemes. In AJK, this number is estimated to be 82,300 households. In both NWFP and AJK, about 80-85 percent of the water supply schemes are gravity based, with the remaining percentage being tube-wells, dug-wells and hand-pumps. Major damage has been reported at the intake of gravity schemes, and to a lesser extent to supply mains due to landslides and to distribution systems due to house/building collapse. The damage to water reservoirs, hand pumps, and tube-well schemes has been reported to be minimal. In rural areas the damages are mainly to the source, intake structures and water mains, and to a much lesser extent to the tertiary networks. Major damage to sanitation is in the form of destroyed household toilets and to a lesser extent to drains and public toilets.

72. **(b) Recovery needs – Rs. 1.9 billion (US\$32 million).** Reconstruction needs for water supply and sanitation include infrastructure replacement and support for implementation. Short term needs, estimated to cost about Rs. 1.15 billion, should focus on: (i) rehabilitation of partially-damaged government and community spring/gravity, dug-well, and hand-pump infrastructure; (ii) rehabilitation of partially-damaged surface water schemes and associated treatment plants; (iii) rehabilitation of communal latrines; (iv) initiation of a solid waste management program for clearing and recovery of debris material,

particularly in urban areas, with designated dumping zoning and disposal practices; and (v) provision of basic buildings for AJK Government staff supporting water and sanitation-related agencies. The medium term needs (Rs. 753 million) and associated strategy should focus on: (i) providing water distribution networks for reconstructed settlements and for selected new settlements resulting from land readjustment and small-scale relocation schemes; (ii) provision of drainage and/or sewerage for reconstructed settlements; (iii) formalization of solid waste management schemes in large towns; (iv) reconstruction of full AJK Government Public Works and Local Government Rural Development Department offices; and (v) upgrading of sector facilities for improved disaster preparedness.

73. **Energy. (a) Damage – Rs. 744 million (US\$13 million).** Damage to the four energy subsectors—power, petroleum and gas sectors, and subsistence fuels (wood and dried dung)—consists primarily of destroyed operational buildings, staff quarters, equipments in the power sector, and damage to retail stations and related inventory in the fuels sector (petroleum, liquefied petroleum gas (LPG), and natural gas). In addition, ten hydropower generation stations have been partially damaged and will require repairs to return to full operational status. The bulk of power and fuel supply was restored within days of the earthquake, and power is being supplied to all accessible urban and rural areas. For the most part, the initial repairs are temporary and will need to be revisited to establish permanent technical and building structures for continuous energy supply.

74. **(b) Recovery needs – Rs. 2.4 billion (US\$40 million).** For the recovery of the energy sector, two immediate priorities include the electrification of the tent villages and restoration of electricity supply to the customers whose services have not yet been restored. In the short-term, the repair and rehabilitation of existing damaged distribution lines, transformers, and service connections is needed. The sufficient provision of electricity must be an integral part of the planning and implementation process to ensure that new service connections are in place to supply power to newly constructed houses. The cost estimates have incorporated technological upgrading of the equipment to ensure improved efficiencies and quality of services, which will benefit the area through increased economic activity. A major additional cost related to the reconstruction of the energy sector is caused by the moratorium on electricity payments. In order to ensure financial sustainability, payment for power and fuels will have to be made to protect the distribution companies and fuel retailers.

75. **Governance and Institutions. (a) Damage – Rs. 3 billion (US\$50 million).** The most severe impact in this sector has been the widespread damage to buildings and equipment, and the trauma associated with loss of life and injury. For example, fifty-five provincial office buildings and 9 (90 percent) district and 249 provincial officers' residences were destroyed. Immediately following the disaster, civil administration in many districts was severely disrupted due to the destruction of administrative complexes and sub-divisional office buildings. Courts were at a standstill, and policing was severely affected. In affected municipalities, about 25 percent of the revenue records and 85 percent of municipal records appear to have been lost, including birth, death, police and judicial records.

76. **(b) Recovery needs – Rs. 4.3 billion (US\$72 million).** This figure encompasses the cost for recovery in the civil administration, judiciary and police sectors.

77. **Industry and Services. (a) Damage – Rs. 8.6 billion (US\$144 million).** Due to the lack of any major industry or manufacturing in the affected areas, the damage to the private sector is largely restricted to trade activities. All eight affected districts have a substantial number of trade-related activities comprising retail, restaurants, and wholesale warehousing. Mansehra district in NWFP, which contains the tourist towns of Kaghan, Naran, and Balakot, also sustained significant damage to its tourism infrastructure. Similarly in Muzaffarabad district in AJK, the handicraft sector was substantially damaged. Direct damage to assets in the private sector comprises building façades of commercial enterprises, which are mainly restricted to retail shops. The capital damage indicates losses to the goods,

inventories, and other working capital. These establishments also suffered indirect losses, which refer to output lost due to business interruption caused by the earthquake.

78. **(b) Recovery needs - Rs. 9.2 billion (US\$155 million).** The reconstruction needs for the trade sector are attributed to the reconstruction of the damaged and destroyed buildings and the replacement of lost capital assets. In the short term, the aim should be to restore the abilities of medium, small-scale and even unregistered businesses to restock basic supplies and to re-engage in commerce, which is central to the livelihoods of people living in affected areas. Restoring basic infrastructure and facilitating access to financial resources—from domestic and foreign remittances, microfinance institutions, and banks—is an essential first step. The Government will have a key role to play in helping entrepreneurs rebuild their businesses quickly and returning commerce to normalcy in the affected regions.

E. APPROACH TO RECONSTRUCTION AND RECOVERY

79. International experience, most recently acquired from reconstruction and recovery efforts in response to the Gujarat earthquake and the 2004 tsunami, demonstrates that while rescue and relief operations can be relatively quick to mobilize, the process of converting financial commitments into effective action is marked by unanticipated delays, unrealized expectations, and denial of rights. Recovery operations perform better when they are aligned with local governing arrangements. Legally mandated and functioning local authorities should not be ignored; experience elsewhere shows that they can be the determining factor in ensuring speedy and appropriate responses.

80. Effective and timely post-disaster rehabilitation and recovery has occurred where the following governance and institutional principles have been observed.

81. **People-centered solutions.** Whenever possible, affected people should receive flexible external support to assess their own needs, make arrangements for shelter, and restore their livelihoods. Special institutional and legal arrangements should be established to protect vulnerable groups such as orphans, women and missing persons from abduction and trafficking. Identities and entitlements must also be protected, and therefore systems must be put in place to secure lost records on revenue, property, death, birth, banking, police, judiciary, and state and community land. Likewise, concerted efforts need to be taken to guarantee civil rights, particularly of vulnerable populations, through the simplification of judicial and administrative procedures and through the provision of legal aid. Civil society should be positively engaged in recovery operations, while recovery for the private sector in service delivery should also be facilitated, minimizing compensatory actions that distort market response. A clear strategy is needed for transition from the relief to recovery phases, from military to civilian control, and from short term executive controls to legally sanctioned, locally elected leadership.

82. **Subsidiarity and restoration of responsibility to legally mandated institutions** is important for speed, relevance, and accountability of recovery operations. While centralizing the strategic planning of the recovery strategy, it is important to return responsibility for all other executive functions to the lowest level of mandated and competent authority. This will enable recovery operations to exploit local knowledge and build local capacity for the restoration of government capacity. The Government will need to announce such commitments and implement protocols for responsibility and reporting at all levels of the recovery operation. Existing coordinative and regulatory arrangements should be exploited in the planning, execution, and accountability of recovery operations.

83. **District and central strategic coordination and accountability** should be accorded high priority. Special purpose district arrangements are needed to facilitate coordination between army and civilian agencies and civil society during restoration of accountability of the local administration to elected representatives. To ensure central and provincial strategic accountability, clear assignment of responsibilities is required at the national and province levels for the following functions: (i) cross

sectoral policy coordination; (ii) multi-agency coordination; (iii) information clearing house on responses; (iv) documenting government and donor commitments; (v) monitoring compliance with agreements; and (vi) advising on inventive revenue raising options. Furthermore, donor engagement should be tailored according to sector features, the scale of the damage, and the donor's comparative advantages and capacity to respond.

84. ***Competing demands need to be managed through technical and policy*** choices that improve the speed of recovery responses. A balance is needed between replacing lost facilities and services where the cost is marginal and efficiency gains clear, and on the other hand, avoiding the replacement of facilities known to be under-serving or inadequate prior to the disaster. Government guidelines regarding eligibility for inclusion in financing and earthquake recovery operations are needed. Service delivery reform should focus on situations where replacement of lost infrastructure is unlikely to impact service access or quality. Where possible, sector responses should favor gender sensitive and environmentally sound repair and rehabilitation over wholesale reconstruction, with due regard to local knowledge and materials.

85. ***Enhance operational capacity to respond by known institutional solutions.*** Umbrella approvals should be sought for multiple standard works and responses that can facilitate larger scale contracting and common protocols for key steps. Because local capacity must be augmented, the Government should make explicit the expected increase in responsibilities and assist with the review of annual development plans, the development of schemes, and the preparation of protocols at the state and district levels. Furthermore, inventive arrangements and the contracting of technical specialists will be needed to strengthen local capacity to meet the responsibilities for planning, budgeting, implementation and quality assurance of recovery operations. Exploiting existing assignments will encourage multiple institutional arrangements through which works and services are currently delivered. Also, whereas market responses should largely be facilitated, selective government direction of the private sector may be justified where market response fails.

86. ***Accountability and enforcement of standards and norms*** requires functioning administrative dispute resolution systems and full extension of supreme audit institutions, backed by functioning judiciary and legal institutions. Campaigns are needed to ensure citizens have access to information about all recovery operations. A common donor, government, and civil society commitment to zero tolerance for corruption must be backed by full extension of the Auditor General of Pakistan's (AGP) jurisdiction to all agencies involved in recovery operations, third party verification of contracts, and use of Pakistan's existing arrangements for community-based social audit.

F. HAZARD RISK MANAGEMENT

87. Pakistan frequently experiences weather-related hazards, resulting in significant economic losses from localized and seasonal floods, landslides and droughts. Large scale earthquakes have resulted in serious life and property losses, such as the 1935 Quetta earthquake and the 8th of October disaster. Seismic risk is high in many parts of Pakistan and may be higher than recognized in densely populated cities such as Karachi, Islamabad and Rawalpindi. Lack of enforcement of building codes, unsafe land use patterns, and poor construction practices contribute to high economic and human losses. Changes in demography and climate, urbanization and unsound construction practices may increase frequency and future losses from disasters, potentially a significant setback to the country's development.

88. At present, Pakistan has an ad hoc approach to hazard risk management. Interventions are primarily focused on relief and response with insufficient ex ante mitigation measures. Flood and drought management has been receiving the most institutional and financial attention due to their socio-economic impact and political importance. Seismic risk reduction is less recognized, hence receives less attention. The National Calamities Act (1958) gives a framework for government response and preparation for

disasters nationwide. The Local Government Ordinance (2001) includes provisions for local administration to develop and enact disaster management and risk mitigation measures. There are systems in place for providing relief following a disaster through the Emergency Relief Cell that coordinates federal response to disasters and administers federal relief funds. In large scale disasters, the army is the main institution with quickly mobilized logistical capacity to respond.

Strategic Approach to Hazard Risk Management

89. In light of the devastation caused by the 2005 earthquake, it is important to take into account some of the factors that may have exacerbated the damage in affected areas. The following critical issues comprise five pillars that elaborate a comprehensive hazard risk management approach: risk identification, emergency preparedness and response, risk reduction, capacity building, and risk transfer. This approach should be reflected in the design and implementation of the recovery strategy, as existing vulnerabilities to natural hazards should be mitigated as much as possible.

Pillar I: Risk Identification

90. ***Seismic hazard analysis.*** Seismotectonic considerations indicate that similar or larger events in the same or neighboring regions are possible. A seismological monitoring network exists but is in need of modernization. Efforts to undertake a new seismic risk analysis of Pakistan should also be intensified.

91. ***Multi-hazard risk assessment and mapping.*** An integrated assessment of the potential impact of multiple hazards on people, infrastructure and economy is good practice. The potential losses from disasters should inform national development plans. Assessments of risks of the affected areas should inform reconstruction decisions and further nationwide, multi-hazard risk mapping should feed into future development plans.

Pillar II: Emergency Preparedness and Response

92. ***National level.*** A national disaster management strategy, which builds upon existing entities and mechanisms already in place, should be devised and implemented. Channels to improve coordination between the national entities and local administration should be explored.

93. ***Local level.*** After the disaster, communities themselves were the first responders and local administration continues to be the coordinator of activities on the ground. Communities, local authorities and NGO community should be encouraged and trained to cooperate and be better prepared.

Pillar III: Investment in Risk Reduction

94. ***Reducing risks in post-earthquake reconstruction.*** Post-earthquake reconstruction is a major investment. The GoP should take this opportunity to protect the reconstruction of public and private buildings and infrastructure from various types of hazards. Lessons learned from the damage should be fed into reconstruction planning and future risks reduced through improved building standards and design considerations.

95. ***Protection of public infrastructure.*** A significant amount of public infrastructure was severely damaged by the earthquake. Safety of public buildings such as schools and hospitals is particularly important, and their reconstruction should incorporate improved building standards to reduce their risk of future collapse or damage in the event of a subsequent disaster. It is recommended that the Government create an entity with the requisite technical capacity and mandate to review and approve the designs for public buildings in order to ensure that seismically appropriate standards are applied.

96. **Land use.** Site conditions appear to have influenced the level of damage. Landslides occurred on steep slopes. Settlements such as Muzaffarabad and Balakot built on flood plain deposits of alluvial soil received amplified impact from the earthquake. Building design and land use decisions both in the reconstruction phase and in urban development plans need to integrate identification of potentially risky areas into planning decisions.

97. **Legislation and standards for future safety.** Building collapse was due to their very poor quality of construction and lack of seismic consideration in their design. The primary lesson to be learned is that new buildings need to be seismically designed and built to a higher quality standard. Compliance with regulations and codes needs to be better enforced.

98. **Retrofitting.** During the reconstruction phase, repair of both damaged and vulnerable buildings needs to include seismic strengthening. Buildings in Pakistan are generally vulnerable to earthquakes; therefore, the feasibility of a national seismic retrofitting program should be examined, beginning on a priority basis with schools and hospitals.

Pillar IV: Capacity Building

99. **Institutional capacity building and coordination.** The lessons and experiences of current relief and recovery coordination should be distilled in developing an appropriate disaster management mechanism and authority, as well as a national plan that clarifies roles and responsibilities and strengthens coordination among different government agencies.

100. **Education and training.** Systematic training for disaster management should be improved in Pakistan. Professional education and civil servant training could greatly improve risk management in the country. Primary and secondary school textbooks should also raise awareness of risks as part of the education curriculum. Basic training of contractors and builders on safety measures for construction should also be considered as part of the reconstruction process.

101. **Public awareness-raising.** A major public awareness campaign on risks, preparedness, and vulnerability reduction should be implemented as soon as possible. Information dissemination programs would greatly improve people's understanding of existing natural risks and how to mitigate their impacts.

Pillar V: Mechanisms for Risk Transfer and Financing

102. Risk transfer through insurance allows for the burden of reconstruction to be shared among public and private actors and protects valuable resources. In Pakistan, insurance penetration is limited. The Government could provide a regulatory role and review the existing framework for the insurance sector within Pakistan. It could also allow space for the private sector to develop private insurance basis, or the Government could choose to invest in purchasing insurance for its own assets to prevent future losses caused by disaster impacts. The feasibility of tailoring an insurance package to the poor that addresses their main post-disaster risks, as well as Government investment in ex ante risk reduction measures for protection of public assets, should be investigated.

103. **Mitigating the social and economic impacts of future disasters.** While the recent earthquake was a tragic event and the immediate focus should be on response and recovery, it should be borne in mind that Pakistan will suffer from future earthquakes. In fact, Pakistan has very substantial seismic hazard, so that parts of the response and recovery program should be developed bearing in mind future earthquakes and how the current response and recovery experience can be usefully employed in other parts of Pakistan.

104. In many parts of the world, major earthquakes tend to occur in cycles in which stress builds up in tectonic plates over decades to centuries, which results in increasing seismicity culminating in a large earthquake. Available evidence indicates the Himalayas follow this pattern. The October 8, 2005 earthquake occurred in a region “where a great plate-boundary earthquake has long been considered overdue”,⁶ resulting in only about 25 percent of the energy of the potential great plate-boundary earthquake being released. Release of the remainder of the energy would require a magnitude 7.9 event. The potential exists for the same area affected by the October 8 event, to be affected by a larger earthquake. Beyond the Kashmir seismicity, Quetta and Karachi also have serious seismic risk.

105. Consequently, building and reconstruction in the area damaged by the recent earthquake should occur in conformance with modern seismic codes and good construction practices. Beyond the affected region, older buildings will be removed by attrition over the next several decades, but seismic retrofitting of selected facilities (schools, hospitals, etc), upgrading of construction quality, research and development of earthquake engineering capacity, risk based planning of investments and other actions are required which, combined, form an integrated national earthquake risk reduction program. This earthquake risk reduction program would actually be a key component of a broader multihazard risk reduction strategy, as discussed above.

⁶ Bilham R and K Wallace, (2005), Future Mw>8 earthquakes in the Himalaya: implications from the 26 Dec 2004 Mw=9.0 earthquake on India's eastern plate margin, *Geol. Surv. India Spl. Pub.* 85, 1-14.